



rwoodard#064#water.ca.gov#064#INET1@MW\_X400 on 03/02/98 03:45:44 PM

To: Sarah E Holmgren/User/Americas/Montgomery Watson@MW,  
jheath#064#water.ca.gov#064#INET1@MW\_X400

cc:

Subject: Sacramento River Watershed Program Future Direction

>From: Gfredlee <Gfredlee@aol.com>

>Date: Sat, 28 Feb 1998 15:48:57 EST

>To: jheath@water.ca.gov

>Cc: connorv@gwgate.swrcb.ca.gov, rwoodard@goldeneye.water.ca.gov,  
> foec@gwgate.swrcb.ca.gov, tomg@lwadavis.com, Gfredlee@aol.com

>Subject: Sacramento River Watershed Program Future Direction

>X-Mailer: AOL 3.0 for Windows 95 sub 62

>

>Dear Judy,

>Attached is a set of comments that I have sent to Val Connor and others on my  
>recommendations for the future direction of the Sacramento River Watershed  
>Program. I am bringing this to you and other CALFED WEQTG staff's attention  
>since it has direct application to the water quality program for the Delta.  
>If you or others have questions on the suggested approaches, please contact  
>me.

>

>Fred

>

>- - - - -

>

>Val Connor et al.

>

>Please find presented below a set of comments that I have sent to Jerry  
>Trojan

>on my suggestions for the future direction of the Sacramento River Watershed  
>Program. Basically, I am suggesting that this Program continue to follow the  
>Evaluation Monitoring approach focusing on finding real significant water  
>quality use-impairments, determining their cause and the sources of the  
>constituents responsible and then developing site-specific programs for their  
>control. If you or others have comments or questions on this approach or my  
>comments, please contact me. If anyone wishes additional information on the  
>issues I have raised, please let me know. Also, please feel free to  
>distribute these comments to others who you feel may be interested.

>

>Fred

>

>- - - - -

>

> G. Fred Lee & Associates

>

> 27298 E. El Macero Dr.

> El Macero, California 95618-1005

> Tel. (530) 753-9630 Fax (530) 753-9956

> e-mail gfredlee@aol.com

>web site: <http://members.aol.com/gfredlee/gfl.htm>

>Please note the new area code for telephone and fax has been changed to 530

>

> February 28, 1998

>

>Recommendations for Future Direction of the Sacramento River Watershed  
>Water Quality Management Program

>

>Jerry Trojan

>Sacramento Regional County Sanitation District  
>8521 Laguna Station Road  
>Elk Grove, CA 95758

>  
>Dear Jerry:

>  
> Following up on your "Announcement of Workshop and Request for Input on  
Phase  
>IV Funding" for the Sacramento River Watershed Program, I had a conflict  
with

>the February 24, 1998 workshop and therefore I was unable to attend.  
However,

>I am interested in this topic and, as you know, have been an active  
>participant in suggesting approaches that should be considered in conducting  
>this Program. Please find presented below my comments on the future  
direction

>of the Program. At this point, it is too early to define in detail the  
future

>direction since as of yet little data have been generated. My comments  
>however, provide guidance on the overall approach that would accommodate any  
>type of data that are developed. I am not clear as to what phase we are in  
>now-- when Phase III starts and ends, etc. Therefore, the comments presented  
>below which are directed to Phase IV may also be applicable to Phase III and  
>other phases of the program.

>  
>Evaluation Monitoring as a Framework for  
>Water Quality Problem Identification and Management

> In the spring of 1996, I suggested to the group that an Evaluation  
Monitoring

>approach be used as a framework for the first year's monitoring program.  
>Evaluation Monitoring as developed by Dr. Jones-Lee and myself shifts the  
>monitoring from chemical constituent concentrations and loads to finding real  
>water quality problems and then focuses on determining their cause, defining  
>the sources of the constituents responsible. This is the approach that we  
>developed about 3.5 years ago for the work that we are now doing in Orange  
>County on the Upper Newport Bay watershed. As discussed in our paper,  
>"Assessing Water Quality Impacts of Stormwater Runoff," and in the  
>presentation that I made at the SETAC National meeting last November,  
>"Evaluation Monitoring for Stormwater Runoff Water Quality Impact Assessment  
>and Management," both of which are available from our web site  
>(<http://home.pacbell.net/gfredlee/index.html>), Evaluation Monitoring is a  
>watershed-based, technical stakeholder-driven water quality problem  
definition

>and control program that could readily serve as the foundation for the  
>Sacramento River Watershed Water Quality Management Program. Basically, this  
>program focuses on the impacts of chemical constituents and pathogenic  
>organisms indicators rather than determining their concentrations. Those  
>familiar with water quality, aquatic chemistry and aquatic toxicology know  
>that it is not possible to use chemical concentrations of the type that are  
>typically generated in constituent source and ambient water monitoring to  
make

>a reliable assessment of the water quality impacts associated with the  
>constituents measured. The exceedance of a water quality standard is not a  
>reliable indication of a true water quality problem that would be of concern  
>to the public. Many exceedances simply represent the overly protective  
nature  
>of US EPA water quality criteria and state standards based on these  
criteria.

>  
> As a member of the US EPA peer review panel that reviewed the overall  
>criteria development approach and as a member of several of the criterion  
>document peer review panels, I can unequivocally state that the US EPA  
>criteria would, in many if not all parts of the Sacramento River  
watershed, be

>overly-protective. If there was an infinite amount of money that could be  
>spent to control chemical constituents within the Sacramento River watershed,  
>then working toward a goal of achieving these criterion values would be  
>appropriate, provided that there were not other significant social problems  
>which needed funding. However, today, with a large number of social problems  
>that need funds, and limited funding for water quality management, it is  
>important to focus water quality management programs on solving real,  
>significant water quality use impairments that significantly adversely impact  
>the beneficial uses of a waterbody. By impairment of beneficial uses with  
>respect to the aquatic life-related uses, I mean significantly alter the  
>numbers, types and characteristics of desirable forms of aquatic life in a  
>waterbody, cause aquatic organisms that are used as food to have excessive  
>concentrations of hazardous chemicals in their tissue through  
bioaccumulation,  
>and/or lead to other water quality use impairments, such as excessive growth  
>of aquatic plants, low dissolved oxygen, etc.

>  
>Traditionally, water quality monitoring programs have focused on measuring  
>the concentrations of a constituent and if the flow data are available, the  
>load of the constituent passing a particular point and then try to  
extrapolate  
>as to whether the constituent at a particular concentration is adverse to the  
>beneficial uses of a waterbody. Toxicity to aquatic life is one of the  
>primary areas of concern for many chemical constituents. Evaluation  
>Monitoring, rather than trying to extrapolate from chemical concentrations to  
>toxicity, focuses on measuring toxicity directly and then determining through  
>TIEs the cause of the toxicity and through forensic analysis, its source.  
>Similarly, rather than trying to extrapolate from chemicals that are  
>potentially bioaccumulatable to excessive tissue residues, Evaluation  
>Monitoring measures directly whether excessive bioaccumulation has  
occurred in  
>edible organisms in the receiving waters and then where such problems are  
>found, through forensic studies, determine the sources of constituents  
>responsible. This is the approach that is being used to a considerable extent  
>in the Sacramento River watershed first year monitoring through the  
>implementation of the Evaluation Monitoring approach.

>  
>Review of Existing Water Quality Characteristic Data  
>As implemented in the Orange County, CA Upper Newport Bay watershed studies  
>that are being conducted under my guidance, the first phase of the Evaluation  
>Monitoring program was a critical review of the existing database on the  
water  
>quality characteristics of Upper Newport Bay and its tributaries. Based on  
>this review, information gaps were defined and the monitoring program then  
>focused on filling these gaps. At this point, the Sacramento River Watershed  
>Program, to my knowledge, has not yet conducted the critical comprehensive  
>review of the existing database to determine what is known about water  
quality

>characteristics of the various parts of the Sacramento River watershed.  
While

>there were some general consideration of what data had and were being  
>collected as part of setting up the first year's monitoring, there was no  
>proper evaluation of existing databases. This is a significant deficiency in  
>the existing Sacramento River Watershed Program.

>  
>The purpose of the data review would be to critically evaluate the  
>reliability of the existing data and compile a credible database. Once this  
>database has been compiled, then a critical review of the reliable data  
should  
>be conducted to determine what water quality problems have been potentially  
>identified as well as confirmed through the existing database. This should  
>then be presented to the watershed stakeholders for their review and comment.  
>Associated with that presentation should be a discussion of the areas that  
>need future attention, with specific recommendations on the kind of

monitoring

>program that should be conducted to fill the information gap. This situation  
>should be addressed as soon as possible where a comprehensive report is  
>provided on the existing water quality of the Sacramento River watershed. If  
>it is not completed by the time Phase IV starts, it should be highest  
priority  
>for work in Phase IV.

>  
> Once a comprehensive set of data from past studies as well as one year of  
>monitoring conducted as part of the Sacramento River Watershed Program has  
>been collected and a report prepared on this database, then a stakeholder-  
>developed consensus should be formulated on what real water quality use  
>impairments exist in the various parts of the Sacramento River watershed.  
>When the water quality use impairment problems have been defined, then if the  
>cause of these impairments has not been determined, site-specific studies  
>should be undertaken to determine the cause, i.e. the specific chemical  
>constituents responsible for the use impairments.

>  
> A use impairment should be a designated beneficial use impairment of the  
>waterbody that is perceivable by the public. Not included in this definition  
>is an exceedance of a water quality standard/objective. The water quality  
>significance of exceedance of a water quality standard/objective should be  
>addressed as a separate issue, where specific studies are conducted to  
>determine the relationship between the exceedance of the objective and the  
>impairment of the beneficial uses of the waterbody of concern for the public.  
>Also specific evaluations should be made of the improvement in the designated  
>beneficial uses of the waterbody that would accrue through controlling the  
>input of the constituent responsible for the water quality objective  
>exceedance to a sufficient extent to eliminate the exceedance so that it  
>occurs no more than once every three years i.e. current CWA requirements.

The

>emphasis in defining the cause of the water quality problem should not be on  
>total constituent, such as total copper, cadmium, lead, etc., but on the  
>specific forms of the constituent responsible for the toxicity, excessive  
>bioaccumulation or other use impairment, such as available forms of nutrients  
>that impact excessive fertilization of a waterbody.

>  
> When the specific constituents responsible for the use impairment have been  
>identified, then through forensic studies, the specific sources of the  
>constituents responsible for the use impairment should be determined. Again,  
>the focus should not be on all sources of total copper or other constituents;  
>it should be on those sources of copper, mercury, PAHs, etc. that are adverse  
>to the beneficial uses of a particular part of the Sacramento River  
watershed.

>In summary, future efforts in the Sacramento River Watershed Program  
should be

>devoted to defining those areas of the watershed where there is a designated  
>beneficial use impairment. The focus should initially be on the main stem  
and  
>major tributaries of the Sacramento River. As problems in those areas are  
>defined, then the water quality definition activity should shift to smaller  
>tributaries.

>  
> A key component of the future Sacramento River Watershed Program should be  
>devoted to the second phase of an Evaluation Monitoring program which focuses  
>on determining the specific cause of the use impairment and the source of the  
>specific constituents responsible for the use impairment. This information  
>base will then provide the stakeholders and the regulatory agencies with the  
>information they need to formulate a watershed-based water quality management  
>program for specific areas of the Sacramento River watershed where there is a  
>use impairment.

>  
>Addressing Exceedances of Water Quality Criteria/Standards

> Another component of the future Sacramento River Watershed Program should be

>devoted to determination of what the exceedance of a water quality  
 >standard/objective means to the beneficial uses of a part of the watershed  
 >where the exceedance occurs and downstream waters. The US EPA water quality  
 >criteria and state standards (objectives) based on these criteria assume  
 >worst-case or near worst-case conditions in developing the specific chemical  
 >numeric values. The chemical constituents of potential concern are  
 assumed to  
 >be in toxic/available forms and present in the vicinity of the organism for  
 >extended periods of time to cause chronic toxicity. The US EPA's regulatory  
 >approach, however, tends for many waterbodies, but not all, to over-regulate  
 >chemical constituents since many waterbodies contain constituents that  
 >detoxify or otherwise make unavailable, chemical constituents of concern. As  
 >a member of the US EPA peer review panel that helped develop the water  
 quality  
 >criteria development approach and as an individual responsible for serving as  
 >an EPA peer reviewer for several specific constituents criteria documents, I  
 >know that the US EPA water quality criteria were never intended to be  
 >implemented as mechanical, not-to-be-exceeded values. The US EPA site-  
 >specific criterion adjustment approach, such as the Water Effects Ratio  
 >approach, only partially adjusts for the aquatic chemistry of constituents in  
 >aquatic systems that impact their toxicity/availability. This approach does  
 >not allow adequate time for chemical equilibrium to be reached and fails  
 >completely to address the key issue of the impact of the form of the  
 >constituent of concern added to the waterbody on its toxicity/availability.  
 >  
 > The current implementation approach of assuming that US EPA water quality  
 >criteria are appropriate state standards leads to significant over-regulation  
 >of most regulated constituents, i.e. those constituents for which there is a  
 >water quality criterion, for most waterbodies. This will certainly be the  
 >case for much of the Sacramento River watershed. In some cases, much higher  
 >concentrations of constituents of concern can be present without adversely  
 >impacting the designated beneficial uses of the Sacramento River watershed as  
 >well as the Delta and other downstream waterbodies.  
 >  
 >Formulation of Water Quality Management Programs  
 > Once the true water quality problems have been defined and the source of the  
 >specific constituents responsible for the problem identified, then there is  
 >need to begin to formulate water quality use impairment management plans. As  
 >part of that formulation, there is need to incorporate high-quality current  
 >science and engineering into determining the potential benefits of  
 controlling  
 >the input of a constituent responsible for a water quality use impairment  
 to a  
 >particular degree on the beneficial uses of a particular part of a waterbody  
 >usually near the point of discharge/runoff (near field impacts) and on the  
 >overall beneficial uses of the waterbody (far field impacts). Typically  
 >today, water quality management programs for specific constituents in the  
 >current point source discharge management program as well as for watershed  
 >based water quality management programs are being formulated without adequate  
 >incorporation of aquatic chemistry and aquatic toxicology into the program.  
 >The mass load approach based on total constituent loads is an example of a  
 >technically invalid approach for formulating a watershed based water quality  
 >management program.  
 >  
 > It is well known that not all sources of a constituent of concern contribute  
 >the constituent in toxic available forms. Further it is also well known that  
 >even a discharge of a toxic available form in one part of a watershed does  
 not  
 >lead to that constituent being toxic/available throughout downstream waters.  
 >An example of this situation is copper in the Sacramento River system  
 >discharged by the Iron Mountain Mine. While there is toxicity due to copper  
 >near the point of discharge, this toxicity appears to be rapidly lost in the  
 >Sacramento River system. It is inappropriate to assume that the copper  
 >present in the Sacramento River system exceeds the copper water quality

>objective in adverse to the beneficial uses of all downstream waters  
>associated with the exceedance of the objective.

>

> While there is no doubt that the Iron Mountain Mine contributes to copper  
>that is part of the cause of the water quality objective exceedances that  
>occur in San Francisco Bay, the San Francisco Estuary Institute has recently  
>published the results of the 1996 Regional Monitoring Program. This report  
>indicates that after four years of monitoring which included fairly intensive  
>toxicity testing using the same test organism as was used to develop the  
>national as well as the San Francisco Bay site specific water quality  
>objective, that the exceedance of the copper water quality objective is not  
>associated with aquatic life toxicity in San Francisco Bay waters or  
>sediments.

>

> Several years ago I published a paper, "Aquatic Chemistry/Toxicology in  
>Watershed-Based Water Quality Management Programs," which is available  
from my  
>web site. This paper discusses the importance of using current readily  
>available science and engineering into identifying water quality problems  
in a  
>watershed and for formulating technically valid, cost-effective control  
>programs for these problems. As discussed these control programs should  
focus  
>on real significant water quality use impairments and not divert the limited  
>financial resources available to chasing ghosts of problems that arise out of  
>overly protective approaches associated with the US EPA's ill founded  
>Independent Applicability Policy. This Policy requires that chemical  
>specific numeric criteria/standards must be met for potentially toxic  
>constituents even though properly conducted toxicity tests show that the  
>constituents are in non-toxic, non-available forms. For further  
discussion of  
>the inappropriateness of this Policy consult Lee and Jones-Lee, "Independent  
>Applicability of Chemical and Biological Criteria/Standards and Effluent  
>Toxicity Testing," as well as, "Appropriate Use of Numeric Chemical  
>Concentration-Based Water Quality Criteria" both of which are available from  
>my web site. From a watershed based water quality management program  
>approach, the US EPA water quality criteria should be used as a trigger to  
>conduct further work to define the water quality significance of  
exceedance of  
>a water quality objective. An important component of future work in the  
>Sacramento River Watershed Program should be directed to determining the  
water  
>quality significance of the exceedance of a water quality objective. This  
>would be important information in helping to prioritize water quality  
>management programs within the watershed.

>

> The true watershed management approach is designed to try to address the  
>problem that exists today of the piecemeal approach toward regulation where a  
>particular discharger that is regulated through a NPDES permit must achieve  
>discharge limits, even though unregulated dischargers can discharge the same  
>constituents to the waterbody at equal or greater concentrations and not have  
>to control their discharges. An example of this is the organophosphate  
>pesticide situation where POTWs must control the Ceriodaphnia toxicity in  
>their effluent. I have observed situations where POTWs could spend  
>considerable money controlling this toxicity, yet have their effluent enter a  
>stream where urban stormwater runoff contains the same organophosphate  
>pesticides at toxic levels. The POTW's expenditure of funds will have no  
>impact on the beneficial uses, since they are controlled primarily by  
>stormwater runoff or, for that matter, agricultural runoff or atmospheric  
>transport of these pesticides from agricultural use. There is little  
point in  
>forcing one group of stakeholders to treat to a certain degree unless that  
>treatment/control, in fact, results in a significant improvement in the  
>beneficial uses of the receiving waters. The watershed management approach

>provides an opportunity to identify the real water quality problems that exist  
>in a watershed, determine the cause of the water quality use problem and  
>identify the sources of the constituents responsible. It also provides an  
>opportunity for appropriate use of public financial and other resources to  
>control the problems in a technically valid, cost-effective manner.

>  
> Ultimately, the Sacramento River Watershed Program will have to face the  
>issue of formulating management approaches. It should start to face this  
>issue in Phase IV through typical example data and situations which can be  
>used as a basis of formulating approaches for implementation of pollution  
>control programs. Developing an approach for addressing such problems before  
>they are actually faced will provide the information base necessary to  
>determine what additional information will be needed to formulate management  
>programs in the most technically valid manner.

>  
>Water Quality Significance of Aquatic Life Toxicity

> Another issue that will need to be addressed, hopefully starting immediately  
>is the development of an approach for assessing the water quality  
significance

>of aquatic life toxicity of the type being found in the Sacramento River  
>system. I have previously suggested to the various subcommittees (Monitoring  
>and Toxics) and to Val Connor that there is need to organize an effort to  
>provide guidance on how to determine what represents excessive aquatic life  
>toxicity within the Sacramento River system that is adversely impacting the  
>beneficial uses of this system. An expert panel should be appointed and  
>provided with the necessary resources to begin to formulate approaches that  
>can be brought to the stakeholders that can be used to determine the water  
>quality significance of toxicity to certain organisms at certain locations.  
>Once the overall guidance approach is defined, then site-specific application  
>of this approach should be initiated for various parts of the watershed where  
>toxicity has been identified and its magnitude extent and duration is  
>potentially significant to the beneficial uses of the waterbody. There will  
>almost certainly be need to conduct additional site-specific studies focusing  
>on the relationship between measure aquatic life toxicity in tributary waters  
>and mainstem waters on aquatic organism assemblages within these waters.

This

>type of information will ultimately become the key information needed to  
>determine whether measured toxicity is a significant cause of a water quality  
>use impairment at any location within the Sacramento River system. I have  
>previously indicated to Val that if there is interest, I would be happy to  
>assume a leadership role in this effort.

>

> If you or others have questions on my comments on the future direction of  
the

>Sacramento River Watershed Program, please contact me. I can also provide  
>backup papers mentioned herein for those who wish to receive an original  
>hardcopy of them.

>

Sincerely yours,

>

>

Fred

>

>

G. Fred Lee, PhD, DEE

>

>GFL:jg

>